Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In re	)	
	)	
Public Safety and Homeland Security	)	
Bureau Seeks Comment on the Technical	)	
and Operational Feasibility of Enabling	)	PS Docket No. 06-229
Flexible Use of the 700 MHz Public Safety	)	
Narrowband Allocation and Guard Band	)	
for Broadband Services	)	

REPLY COMMENTS OF MOTOROLA SOLUTIONS, INC.

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January 7, 2011

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I. INTRODUCTION AND SUMMARY

Motorola Solutions, Inc. ("Motorola Solutions")[1] submits these reply comments in response to the Public Notice released by the Federal Communications Commission's ("Commission") Public Safety and Homeland Security Bureau ("Bureau") that seeks input on whether to allow public safety agencies to use the 700 MHz narrowband public safety spectrum for broadband services.[2] As detailed below, commenters[3] universally agree on the importance of

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[1] Motorola Solutions has previously participated in this proceeding under the corporate name Motorola Inc. ("Motorola"). On January 4, 2011, Motorola, Inc. completed the separation of its Mobile Devices and Home businesses through the distribution of all of the common stock of Motorola Mobility Holdings, Inc. to its stockholders. Motorola, Inc. then changed its name to Motorola Solutions, Inc. and will continue to operate Motorola's Enterprise Mobility Solutions and Networks businesses to offer a comprehensive end-to-end portfolio of products and solutions, including rugged two-way radios, mobile computers, secure public safety systems, barcode scanning, RFID readers and wireless network infrastructure to enterprises and governments, as well as 4G broadband infrastructure, devices and services to network operators globally.

[2] *Public Safety and Homeland Security Bureau Seeks Comment on the Technical and Operational Feasibility of Enabling Flexible Use of the 700 MHz Public Safety Narrowband Allocation and Guard Band for Broadband Services*, Public Notice, PS Docket No. 06-229, DA 10-1877 (Sept. 28, 2010) ("Public Notice").

[3] Unless otherwise indicated, all comments referenced herein were filed in PS Docket No. 06-229 on December 3, 2010.

providing public safety with state-of-the-art broadband data and video services that will improve their ability to protect the public.[4] But, as detailed below, almost all commenters emphasize that this goal should not be achieved at the expense of mission critical narrowband voice services. Indeed, the record is replete with evidence that any effort to repurpose the 700 MHz narrowband allotment for broadband technologies—even on a voluntary, flexible use basis—will have a negative impact on public safety mission critical voice communications capabilities and will undermine interoperability for both narrowband and broadband operations. As such, the vast majority of commenters oppose the options raised in the Public Notice, and instead urge the Commission to work with Congress to reallocate the 700 MHz D block for broadband purposes.

II. THE RECORD EVIDENCE CLEARLY SHOWS THAT FLEXIBLE USE OF 700 MHZ NARROWBAND SPECTRUM FOR PUBLIC SAFETY BROADBAND WOULD IRREVOCABLY SET BACK PUBLIC SAFETY INTEROPERABILITY.

Commenters overwhelmingly agree that the Bureau should foster *both* nationwide narrowband and broadband interoperability. Unfortunately, the Public Notice's "flexible" use proposal would complicate the development of narrowband nationwide interoperability. Specifically, the record clearly shows that allowing broadband operations over 700 MHz narrowband spectrum would harm narrowband interoperability and potentially foreclose the

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[4] The 700 MHz public safety allocation spans 24 MHz at 763-775/793-805 MHz. The band provides spectrum for both narrowband and broadband technologies. The channel allotments for these two types of technologies are segregated in order to minimize inter-system interference. The narrowband allotment occupies 769-775/799-805 MHz while broadband technologies are confined to 763-768/793-798 MHz. There are two one megahertz guard bands (768-769/798-799 MHz) separating these two allotments.

possibility of nationwide narrowband interoperability altogether.[5] Given this, almost every commenter opposes the Public Notice's proposal.[6]

As an initial matter, commenters highlight the importance of narrowband spectrum for interoperable, mission-critical voice communications[7] and explain that "it is premature to assume

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[5] In the Public Notice, the Bureau asks "what impact would allowing flexible use of ... narrowband spectrum have on the continued ability to support nationwide narrowband interoperability?" *Notice* at 3.

[6] *See*, *e.g.*, Letter from the National Governors Association, National Conference of State Legislatures, The Council of State Governments, National Association of Counties, National League of Cities, The U.S. Conference of Mayors, International City/County Management Association, to Julius Genachowski, Chairman, FCC, PS Docket 06-229 at 1 (filed Nov. 22, 2010) ("We urge you not to open the narrowband public safety spectrum to broadband at this time so as not to interfere with first responders' interoperable radio communications."); Comments of Motorola Inc. at 1-2 ("Motorola Inc. Comments"); Comments of Joint Council On Transit Wireless Communications at 1 ("Joint Council Comments"); Comments of the Region 6 700 MHz Regional Planning Committee at 4 ("RPC6 Comments"); Comments of the Region 43 700 MHz Regional Planning Committee at 1 ("RPC43 Comments"); Comments of the Region 39 700 MHz Regional Planning Committee at 1 ("RPC39 Comments"); Comments of the State of Arkansas, Wireless Information Network at 2 ("Arkansas Comments"); Comments of the Region 8 700 MHz Regional Planning Committee at 2 ("RPC8 Comments"); Comments of the American Association of State Highway and Transportation Officials at 2 ("AASHTO Comments"); Comments of the Public Safety Spectrum Trust Corporation at 1 ("PSST Comments"); Comments of the Telecommunications Industry Association at 2 ("TIA Comments"); Comments of the States of Maryland and Delaware at 2; Comments of Ronald G. Mayworm, Chairman of the Region 49 Regional Planning Committee at 2 ("RPC49 Comments"); Comments of the National Public Safety Telecommunications Council at 1 ("NPSTC Comments"); Comments of the California Statewide Interoperability Executive Committee at 1 ("CalSIEC Comments"); Comments of the Commonwealth of Virginia at 1-2 ("Virginia Comments"); Comments of the Association of Public-Safety Communications Officials-International, Inc. at 3 ("APCO Comments"); Comments of Idaho's Statewide Interoperability Executive Council at 1 (Dec. 1, 2010) ("Idaho SIEC Comments").

[7] In arriving at this conclusion, public safety and emergency responders document how inadequate spectrum allocations historically have frustrated the goal of nationwide interoperability and emphasize the importance of the 700 MHz narrowband allocation for narrowband interoperability. *See*, *e.g.*, Arkansas Comments at 3 ("We diligently worked to ensure that we have sufficient 700 MHz channels to support all of the State and local agencies currently and planning on operating on this network. The 700 MHz narrowband is the only spectrum block which can meet this need, given the limited availability of the 800 MHz, VHF and UHF public safety public safety channels."); RPC8 Comments at 2 ("The 700 MHz public

that broadband is a viable replacement for narrowband voice operations."[8] The Commonwealth of Virginia, for example, "challenges the Commission's assertion that broadband technology could ever fully support public safety operations at the same or better level … [than] private land mobile radio networks."[9] APCO agrees that "broadband will not replace the need for narrowband voice communications, in part because of the inability of current (or foreseeable) broadband standards to accommodate infrastructure-independent (*i.e.*, simplex) unit-to-unit or traditional dispatch style one-to-many communication."[10] In fact, looking into the future, the

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safety narrowband spectrum is the only option available for densely populated urban and suburban areas to relieve the effects of high-capacity and excessive utilization of the 800 MHz networks in order to more effectively support public safety services."); CalSIEC Comments at 1 (In California, "the public safety spectrum is virtually exhausted, leaving 700 MHz as the only spectrum available to State and local agencies for systems expansions or large-systems development."); RPC6 Comments at 4 (explaining that the large number of 700 MHz narrowband applications "demonstrate the genuine need for 700 MHz narrowband spectrum to satisfy a rising demand of, in some cases, over 10 years"); RPC43 Comments at 2 ("700 MHz Narrowband spectrum is generally the only frequency resource available for build out of new systems."); TIA Comments at 5 ("The 700 MHz public safety narrowband allocation is especially vital to these entities in cases where the 800 MHz allocation is fully utilized.").

8 PSST Comments at 6. Notably, in a recent poll APCO conducted to gather information regarding current and anticipated uses of 700 MHz narrowband channels, 80% of respondents "believe that the current narrowband allocation is necessary" and "89% of respondents are with agencies that have or plan some type of 700 MHz narrowband use." APCO Comments at 4.

9 Virginia Comments at 3.

10 APCO Comments at 2; *see also id*. ("Infrastructure-independent unit-to-unit communication is critical for on-scene tactical communications, for communications when one or both radio users are out-of-range from their principal network, or where the network itself has been damaged or is otherwise unavailable to first responders on the ground."); CalSIEC Comments at 2 (A "broadband data system is not efficient at dynamic simultaneous voice communication with a large group of individuals."); RPC43 Comments at 3 (explaining that "until broadband technology progresses allowing for one to many (dispatch) calling and one to one (talk around or simplex) calling, it will not meet the needs of first responders"); PSST Comments at 6 ("There is minimal public safety broadband deployment so far, and the LTE standard does not include direct unit-to-unit 'talkaround' capabilities. Furthermore, it has not yet been shown that voice-over-broadband will provide equivalent or better reliability and features across the variety of public safety operational environments encountered by law enforcement, fire and EMS personnel.").

"3GPP standards body, which oversees the standards for LTE, does not have any agenda item for the next three releases of LTE that would provide the types of one-to-many voice and off-network voice communications that are of vital importance to public safety."[11] Commenters also highlight that narrowband technologies provide for more cost-effective coverage than broadband networks—especially in rural areas— because they do not rely on cellular architecture.[12] In short, it will be a long time before narrowband voice systems are replaced by equally effective broadband designs.[13]

As such, commenters stress the importance of narrowband interoperability and plead with the Bureau to retain the exclusive narrowband designations for the two six MHz blocks of 700 MHz narrowband spectrum.[14] Commenters explain that the "existing 700 MHz narrowband allotment barely provides sufficient capacity to enable nationwide interoperable voice services,"

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[11] Andrew Seybold Comments at 2. King County Washington explains that "while [3GPP] releases 9 through 11 are under development , it is clear they will not be commercially available for deployment within the next three years. Since none of the releases currently adopted by 3GPP, or under development, have voice services defined in a way to fully support Public Safety, it is clear that we will not be able to transition to LTE for all our wireless communications needs." King County Washington Comments at 3.

[12] CalSIEC explains that "economic efficiency in site deployment is also a consideration, because broadband generally needs an exponential increase in the number of sites." CalSIEC Comments at 2.

[13] Motorola Inc. Comments at 8. Notably, the Bureau's proposal would likely not even benefit broadband interoperability. For example, commenters explain that the proposed "flexibility" would "introduc[e] additional complexity and cost for broadband public safety equipment, undermining the economies of scale that public safety, industry and the FCC hope to achieve." PSST Comments at 2. Commenters also explain that "piecemeal availability in which spectrum is used for broadband in some areas but not in others would run completely counter to the goals public safety and the Commission have emphasized for nationwide broadband interoperability." NPSTC Comments at 6.

[14] The 700 MHz narrowband allotment occupies 769-775/799-805 MHz.

and the Bureau's proposal would make narrowband interoperability even more daunting.[15] First, commenters emphasize that "should an area … obtain[] sufficient contiguous spectrum to operate a broadband data path, the number of narrowband voice channels in that region would be reduced leaving systems operating in adjacent zones unable to expand their systems."[16] Specifically, commenters explain that "that a 5 MHz channel is required in order for broadband to operate efficiently and … [t]his means that there will be a maximum of 1 MHz remaining for narrowband channels in any region electing to deploy broadband in the narrowband spectrum."[17] Such a decision will "dramatically reduce the number of State, General Use, Low Power and Interoperability channels available in 700 MHz narrowband plans both in and near regions where such broadband networks are deployed."[18]

Second, allowing for ad hoc repurposing of the narrowband allotment would undercut the significant progress that public safety has made since the 700 MHz allocation. Indeed, reconfiguration of the channel plan would be necessary, and the resulting disruption to the narrowband allotment would require redevelopment of national and regional interoperability plans. Commenters repeatedly highlight that this would be highly intrusive considering public

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15 Motorola Inc. Comments at 5.

16 AASHTO Comments at 3; *see also* PSST Comments at 1 (explaining that "such flexible use would create islands of incompatibility that could significantly impair interoperability"); Arkansas Comments at 3 (explaining that use of the narrowband spectrum for broadband would "negatively affect Arkansas and any neighboring states or cities to which we provide mutual support and who likewise provide such support to our agencies in times of emergency or disaster").

17 Arkansas Comments at 2-3.

18 *Id*. Idaho, for example, has "determined that the mixed use of narrowband and broadband channels would mean we could lose close to 400 narrowband channel pairs in Idaho. This would cause an impact which would leave public safety subscribers with only 25% capacity for voice use in the narrowband spectrum." Idaho SIEC Comments at 1.

safety's significant progress within the confines of the current channel plans.[19] Idaho, for example, explains that it already has "redone [its] regional planning twice in the past five years causing … great expense and thousands of staff hours," and is now "determined to not repeat financial disaster."[20] Section 8 700 MHz Regional Planning Committee similarly explains that the "collective efforts, thousands of man-hours over the course of several years, and the millions of dollars spent in planning system deployment, would be negated and necessitate a massive re-planning effort."[21] And the Joint Council on Transit Wireless Communications emphasizes that "if the FCC were to make an order directly effecting 700 MHz regional plans already approved but not yet licensed or ones that have yet to be approved but are in process, it could take several years to react to those changes which could in some cases potentially jeopardize directly the

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[19] *See*, *e.g.*, RPC6 Comments at 4 (RPC6 "strongly opposes any further reorganization of the 700 MHz band" because "with thirty-five 700 MHz Regional Plans approved, four completed 700 MHz Plans pending at the FCC and several Region-approved plans in the adjacent regions concurrence phase, the contemplated Commission action would require those plans to be re-written - some for a second/third time."); RPC39 Comments at 5 ("[I]f flexibility were allowed, all 55 Regional Plans would need to be changed. Not just the channel allotment process, but the entire Plan may need to be revisited and this would take much time."); RPC35 Comments at 2-3 (explaining that "with the majority of the 700 MHz RPCs having completed their 700 MHz Regional Plans at a cost of many hours of dedicated service by volunteers with full-time 'regular jobs', the FCC must not enact any regulations that would require these plans to be re-written, in some cases for a second time."); Joint Council Comments at 1-2 (explaining that the Public Notice's proposal would affect "narrowband channel plans that have been approved thru several years of effort by each RPC in all 50 states, could potentially impede voice radio systems under construction, or could interfere with plans to develop and deploy future voice radio systems"); CalSIEC Comments at 1.

[20] Idaho SIEC Comments at 1.

[21] RPC8 Comments at 4.

viability of a radio system project."[22] In short, the Public Notice's proposal would significantly frustrate ongoing efforts to foster critical narrowband interoperability.

III. THE RECORD EVIDENCE MAKES CLEAR USING 700 MHZ NARROWBAND SPECTRUM FOR BROADBAND WILL DRAMATICALLY INCREASE THE POTENTIAL FOR INTERFERENCE BETWEEN BROADBAND AND NARROWBAND PUBLIC SAFETY USERS.

Commenter-after-commenter[23] stress that permitting public safety to use the narrowband 700 MHz spectrum for broadband will increase the potential for interference and decrease spectral efficiency.[24] The Public Safety Spectrum Trust, for example, explains that "two neighboring public safety jurisdictions deploying different systems (one narrowband, one broadband) would likely be unable to build out coverage over their entire service area without interference."[25] TIA expands on this concept, emphasizing that "a broadband operator will experience severe interference in a large service area from an inbound narrowband signal" and a narrowband operator adjacent to a broadband operator sending or receiving signals "will

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22 Joint Council Comments at 4. Notably, the "introduction of this Public Notice is creating doubt among some public safety agencies as to whether to implement their 700 MHz narrowband system plans now or wait further until the FCC makes a decision on this possible further change in band plan." Arkansas Comments at 6.

23 *See*, *e.g.*, Motorola Inc. Comments at 15; VDOT Comments at 2; Montgomery County Police Department Comments at 1; TIA Comments at 8; PSST Comments at 4; Arkansas Comments at 4; APCO Comments at 5; Kentucky Comments at 2; Virginia Comments at 1-2.

24 Many commenters emphasize that mixing system technologies in the same spectrum will "recreate[] the 800 MHz Nextel dilemma where many cellular low elevation broadband fixed sites interfere with low elevation narrowband mobile users interacting with high elevation fixed sites." CalSIEC Comments at 2. Andrew Seybold notes that "since narrowband radios, both base stations and mobile units, are operating at more than ten times the power of their broadband neighbors, the amount of interference between both systems will be as bad if not worse as public safety has experienced in the 850-MHz band … causing severe interference to handheld and mobile units operating on the same band but using higher power and talking to high-level sites." Andrew Seybold Comments at 13.

25 PSST Comments at 4.

experience significant interference in a large edge service area."[26] In both instances, the "signal to noise ratio is too low to prevent interference."[27] TIA also explains that a "public safety licensee that implements a broadband overlay in its 700 MHz narrowband spectrum while using its remaining 700 MHz narrowband channels within that same geographic area (*i.e.*, adjacent channels/blocks) will … find their narrowband voice and broadband data services considerably degraded as a result of transmitter sideband noise, intermodulation, and receiver overload."[28] Additionally, Motorola Inc. explained that "interference will occur when a roaming narrowband radio enters a mutual aid situation in an area where the narrowband channels have been redirected for broadband use."[29]

Commenters further explain that technical standards, operational restrictions, and protocols would be needed to minimize the interference potential between co-channel operation of broadband and narrowband systems. But even these safeguards are ripe with problems. For example, commenters detail the possible use of "buffer zone[s], geographic rings around the broadband networks, to separate [a] narrowband network from a broadband network."[30] But this would result in coverage gaps "where neither broadband nor narrowband communications can be used" and would require that public safety purchase "expensive" equipment to minimize the spectrum lost to the "buffer zones."[31] As the Commonwealth of Kentucky explains, "flexible use

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26 TIA Comments at 8.

27 *Id*.

28 *Id*. at 7.

29 Motorola Inc. Comments at 15.

30 Arkansas Comments at 4.

31 *Id*.; *see also* APCO Comments at 5 (explaining that "the combination of broadband co-channel protection, and the need for a guard band to protect adjacent-channel blocks, would

creates a major unfunded mandate for the RPCs and the various states" because it "would require more sophisticated frequency planning tools to insure that there was no broadband to broadband interference and/or between voice and data channels."[32]

Moreover, commenters are unsure how buffer zones and other safeguards would be implemented in an even-handed manner. The Commonwealth of Virginia, for example, explains that "interstate coordination of statewide channels is a huge issue which is not addressed in any 'flexible' use proposal."[33] Indeed, interstate coordination is "currently difficult enough for narrowband use."[34] If broadband use of the same spectrum was allowed, "it is not clear how the resulting interference and increase of the noise floor level would be coordinated, or how 'winners' and 'losers' would be selected and given the right to interfere with adjacent systems."[35]

IV. COMMENTERS URGE THE COMMISSION TO FOCUS ON REALLOCATING THE UPPER 700 MHZ D-BLOCK RATHER THAN WASTE RESOURCES REVIEWING THE VALUE OF REPURPOSING THE EXISTING 700 MHZ NARROWBAND SPECTRUM.

Commenters agree that the Bureau's goal of increasing the spectrum available for broadband public safety communications is beyond reproach. Commenters simply disagree with how the Bureau proposes to accomplish the goal. As detailed above, the vast majority of commenters agree that opening up the 700 MHz narrowband spectrum for broadband use would

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effectively prevent most narrowband operations within a wide geographic area near broadband deployments on the current narrowband channels").

32 Kentucky Comments at 2. Kentucky further explains that such "engineering expertise and frequency management systems do not exist at the RPC and/or APCO Frequency Coordination level in Kentucky." *Id*.

33 Virginia Comments at 1-2.

34 *Id*.

35 *Id*.

cripple narrowband interoperability efforts, generate harmful interference among public safety users, and require yet another reconfiguration of the 700 MHz channel plans, introducing unwarranted delay and uncertainty. Instead of adopting the Public Notice's proposal, many commenters urge the Commission to recommend to Congress that it reallocate the 700 MHz D Block for public safety broadband use.[36] The record—developed in both this proceeding and other proceedings—is clear that "such reallocation is the most agreed upon and consistent nationwide answer for enabling the spectrum capacity needed by public safety, especially for multi-media and real-time high resolution video applications, in one adjacent broadband spectrum block for public safety."[37]

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[36] *See*, *e.g.*, Arkansas Comments at 4-5; RPC39 Comments at 6; Montgomery County Police Department Comments at 1; VDOT Comments at 1; NPSTC Comments at 8; Andrew Seybold Comments at 18.

[37] Arkansas Comments at 4-5.

V. CONCLUSION.

The record evidence unquestionably counsels against adoption of the proposals contained in the Public Notice. As detailed above, commenters overwhelmingly agree that opening up the 700 MHz narrowband spectrum for broadband use would cripple narrowband interoperability efforts, generate harmful interference among public safety users, and diminish much of the narrowband deployment progress that public safety entities already have achieved. Instead of adopting the Public Notice's proposal, commenters urge the Commission to recommend that Congress expeditiously reallocate the 700 MHz D Block for public safety broadband use.

Respectfully submitted,

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Dated: January 7, 2011